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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/566,867	Applicant(s) COLLINS, GRAHAM	
	Examiner BACH DINH	Art Unit 1724	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 January 2011.
- 2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 01/27/2011 has been entered.

Summary

1. This is the response to the communication filed on 01/27/2011.
2. Claims 1-19 remain pending in the application.
3. The application is not in condition for allowance.

Claim Objections

4. Claim 1 is objected to because of the following informalities:
 - a. On line 10, "currently" is believed to be the misspelled of "current".Appropriate correction is required.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

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6. Claims 1-19 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 1 recites “flat sensing and counter electrodes arranged in a mutually parallel arrangement” which is not supported by the originally filed specification. It appears that the Applicant relies on figure 2 for support of the above amendment; however, the originally filed specification does not disclose that figure is necessarily drawn to scale nor does the originally filed specification disclose that figure 2 shows the sensing and counter electrodes are arranged in mutually parallel arrangement. Furthermore, the limitation “each of the plurality of current collectors extending through a respective connection aperture of the plurality of apertures parallel to the mutually parallel sensing and counter electrodes” is not supported by the originally filed specification for the same reasons stated above.

Claims 13 and 17 recite “the current collector and seal combination of claim 1”, which includes the limitation “each of the plurality of current collectors extending through a respective connection aperture of the plurality of apertures parallel to the mutually parallel sensing and counter electrodes” that is not supported by the originally filed specification as discussed above.

Claims 2-12, 14-16 and 18-19 are rejected as depends of claim 1, 13 and 19, respectively.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35

U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. Claims 1-8, 10-15, 17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Braden et al. (US 5,298,146) in view of Tabata et al. (US 4,522,406) and Chand (US 4,948,496) with further evidence provided by Ilman et al. (US 4,522,899).

Addressing claims 1, 13 and 17 Braden discloses a current collector for an electrochemical sensor (figure 2) comprising:

A housing 13,

Relatively flat sensing 18 and counter 14 electrodes within the housing and in contact with a liquid electrolyte 12;

A plurality of connection apertures in a wall of the housing directly adjacent corresponding edges of the sensing and counter electrodes (figure 2, the connections 16-20 extend from the electrodes to the outside through the wall of the housing 13; therefore, it is the Examiner's position that the wall of the housing has a plurality of connection apertures having bores directly adjacent to the corresponding edges of the electrodes in order for the connections 16-20 to extend to the outside),

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The current collector further comprising:

A plurality of relatively straight collectors (16-20), each of the plurality of current collectors extending through a respective connection aperture of the plurality of with an end of each trapped against and in direct contact with one of the sensor's electrodes (figure 2).

In figure 2, Braden at the least suggests that the flat sensing and counter electrodes arranged in mutually parallel arrangement and the each of the plurality of current collectors extending through a respective connection aperture of the plurality of apertures parallel to the mutually parallel sensing and counter electrodes. However, lacking explicit disclosure from the specification, Braden is silent regarding the flat sensing and counter electrodes arranged in a mutually parallel arrangement, the current collectors are flexible metal current collectors, each of the plurality of current collectors extending through a respective connection aperture of the plurality of apertures parallel to the mutually parallel sensing and counter electrodes and a compliant seal of a thermoplastic elastomeric material is inserted into one of the connection apertures and the configuration of the flexible current collector and the compliant seal as required by claim 1.

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify gas sensor of Braden to have the flat sensing and counter electrodes in mutually parallel arrangement and each of the plurality of current collectors extending through a respective connection aperture of the plurality of apertures parallel to the mutually parallel sensing and counter electrodes because absent persuasive evidence that the claimed mutually parallel arrangement of the flat sensing and counter electrodes as

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well as each of the plurality of current collectors extending through a respective connection aperture of the plurality of apertures parallel to the mutually parallel sensing and counter electrodes are significant, changes in shape is a matter of obviousness in light of Braden's clear suggestion of the mutually parallel arrangement of the flat sensing and counter electrodes as well as each of the plurality of current collectors extending through a respective connection aperture of the plurality of apertures parallel to the mutually parallel sensing and counter electrodes.

Tabata discloses waterproof seal for connector (figures 6-7); wherein, the flexible connector wire 11 extends through a compliant seal A made of an elastomeric material (4:51-54, the seal is made of elastic synthetic rubber, which is elastomeric material) and the seal A being contact with the collector 11 substantially throughout its length along the current collector (figures 6-7) and the arrangement being such that compressive stress induced in the seal A by reaction from the connection aperture urges the seal into distributed sealing contact with the current collector 11 substantially throughout the length of the seal (5:5-30, the lip 19 in uncompressed stage has a diameter that is larger than the diameter of the cavity 46 and the inner lip 22 has a diameter that is smaller than the outer diameter of the wire; therefore, when the seal A is inserted into the cavity 46, the compressive stress induced in the seal A by reaction from the cavity 46 would urge the seal into distributed sealing contact with the wire substantially throughout the length of the seal A).

Illman provides evidence to show a sealing material 2 made of synthetic rubber material is in fact a thermoplastic elastomeric material (1:53-2:5).

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At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the gas sensor of Braden with the waterproof seal of Tabata for each of the current collectors 16-20 because the waterproof seal would prevent water from entering the gas sensor (Tabata, 2:28-34).

In the modified gas sensor of Braden, the current collectors 17 and 18 would extend within their seals through respective ones of the apertures and the compliant seals A of Tabata are in compression against both the current collectors 17 and 18 and the bores of the apertures in the housing 10 in the similar manner as the complaint seal A is in compression against both the wire 11 and the cavity 46 (Tabata, 5:5-30).

Chand discloses a gas sensor; wherein, the flexible connecting wires 54 and 58 (figure 1) that are connected to the electrodes are made of platinum material (5:46-59).

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the current collectors of Braden with the platinum electrode connecting material as disclosed by Chand because the platinum is flexible as shown in figure 1 of Chand and provides electrical connection between the electrodes and the measuring device 64 (figure 1 of Chand), that is suitable for the operation of Braden's electrochemical sensor. Furthermore, one would still have obtained the predictable result of providing electrical connection between the electrodes and the measuring device when performing the simple step of substituting the known platinum material for the conductive material of the current collectors 17 and 18 of Braden (Rationale B, KSR, MPEP 2141).

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The limitation “over-molded directly onto the flexible, metal current collector” is drawn to the processes of forming the compliant seal over the current collector; therefore, process limitations do not further structurally limit the claimed apparatus (MPEP 2113).

The limitation “the current collects are preliminarily located ... the back-fillings are compressed by end caps” is drawn to the process of forming the seal around the current collector, which does not further structurally limit the claimed apparatus (MPEP 2113).

In figure 7, Tabata discloses the seal A is formed around the wire 11 and the seal A is compressed by the end cap 41, which reads on the structure of the seal and current collector as claimed.

Addressing claims 2-3, figures 6-7 of Tabata, the seal A has many portions with different outer diameters with the outer diameters of the tip portions being the smallest; therefore, the length of the seal A is clearly shown in figures 6-7 as being at least 3 times larger than the outer diameters of the tip portions of the seal.

Addressing claim 4, figure 6 of Tabata shows that the length of the seal A is more than ten times larger than the diameter of the wire 11.

Addressing claim 5, Tabata is silent regarding the length of the seal to the diameter of the wire is at least of the order to 30:1.

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the seal of the gas sensor of Braden and Tabata to have a length that is

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at least 30 times larger than the diameter of the current collector because doing so is a matter of engineering choice and a longer seal would provide additional protection for the current collector along its length. Therefore, one would have arrived at the claimed ratio of the length of the seal to the diameter of the current collector is at least of the order of 30:1 when performing routine experiment in order to optimize the protection provided by the seal to the current collector.

Addressing claims 6-8, Tabata discloses the seal A has a central through bore through which the wire 11 extends; therefore, Tabata discloses the structure of the current collector and seal combination. The subject matters of current claims are drawn to the processes of forming the current collector and the seal combination, which do not further structurally limit the claimed apparatus (MPEP 2113).

Addressing claim 10, Tabata discloses in figure 4 that the seal A has one or more ridges 19 extending around its outer circumference.

Addressing claim 11, Tabata discloses the seal A has a cylindrical body and a larger diameter outer end boss 20 (figure 4).

Addressing claim 12, Tabata discloses the end tips of the seal A are tapered (figure 4).

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Addressing claim 14, Tabata discloses the outer diameter of the ridges 19 is larger than the inner diameter of the cavity 46 (5:11-13); therefore, Tabata discloses an interference fit.

Addressing claim 15, Tabata discloses the seals have cylindrical bodies and the larger diameter outer end bosses 20 (figure 4) and the cavity 46 or connection apertures have a complementary shape (figure 6).

In the modified gas sensor of Braden the apertures made in the housing body 10 would have complementary shape for securely fitting the waterproof seals of Tabata with the current collectors 17 and 18.

Addressing claim 19, Tabata discloses the force exerted by the housing body 45 deform the outer ridges 19 of the seal A without showing any deformation caused to the housing body 45 by the seal A; therefore, it is Examiner's position that the housing body 45 is rigid and has the elastic modulus that is at least two orders larger than the elastic modulus of the compliant seal A.

Braden is silent regarding the material of the housing body 13; however, it is quite obvious that the housing 13 of the gas sensor has to have high rigidity in order to provide protection for the internal components. Therefore, at the time of the invention, one with ordinary skill in the art would have modify the body of the gas sensor of Braden to have the elastic modulus of at least two orders larger than the elastic modulus of the seal A

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because the housing having such property would provide adequate compression force to deform the outer ridges 19 of the seal A; thereby, providing waterproof sealing.

10. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Braden et al. (US 5,298,146) in view of Tabata et al. (US 5,667,406) and Chand (US 4,948,496) with further evidence provided by Illman et al. (US 4,522,899) as applied to claims 1-8, 10-15, 17 and 19 above, and further in view of Watanabe et al. (US 5,225,875).

Addressing claim 9, Tabata is silent regarding the seal having two complementary halves having a central groove for receiving the current collector.

Watanabe discloses a watertight seal (figure 5) comprises two complementary halves having a central groove for receiving the wire C.

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the seal of Braden and Tabata to have two complementary halves as disclosed by Watanabe because the seal of Watanabe would provide secure watertight connection for the connection wire (Watanabe, 3:2-13). Furthermore, one would have obtained the predictable result of forming waterproof terminal connection for the current collector of Braden and Tabata when performing the simple substitution of the watertight seal having two complementary halves of Watanabe for the waterproof seal A of Tabata (MPEP 2141, KSR, Rationale B).

11. Claims 16 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Braden et al. (US 5,298,146) in view of Tabata et al. (US 5,667,406) and Chand (US 4,948,496) with

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further evidence provided by Illman et al. (US 4,522,899) as applied to claims 1-8, 10-15, 17 and 19 above, and further in view of Silfverberg (US 6,638,107).

Addressing claims 16 and 18, Tabata is silent regarding metallic end caps clipped to the housing and captivating the current collectors, thereby providing electrical connections for the sensor.

Silfverberg discloses an electrical connector; wherein, the electrical connector 70 is metallic end cap (4:9, figures 8-9) that clips to the housing 23 and captivating the current collectors 11 (figure 8, the conductors 11 have surrounding sheath to provide electrical insulating and sealant, 4:64-5:13), thereby providing electrical connections (5:15-38).

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the gas sensor of Braden and Tabata with the metallic cap end 70 of Silfverberg for each of the current collector of Lofgren because the metallic cap 70 would act as electrical connector as well as providing ring seal for the current collector (Silfverberg, 5:5-12).

Response to Arguments

12. Applicant's arguments with respect to claims 1-19 have been considered but are moot in view of the new ground(s) of rejection.

Braden is cited and relied on for the first time in this office action in order to disclose a plurality of relatively straight current collectors, each of the plurality of current collectors extending through a respective connection aperture of the plurality of apertures parallel to

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the mutually parallel sensing and counter electrodes with an end of each trapped against and in direct contact with one of the sensor's electrodes as amended in claim 1.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BACH DINH whose telephone number is (571)270-5118. The examiner can normally be reached on Monday-Friday EST 7:00 A.M-3:30 P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Keith Hendricks can be reached on (571)272-1401. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BD
06/03/2011

/Keith D. Hendricks/
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